

FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING/CHEMISTRY

Tuesday, August 13, 2019 — 8:30 to 11:30 a.m., only

RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: <http://www.p12.nysed.gov/assessment/> and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Regents Examination in Physical Setting/Chemistry. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences*.

At least two science teachers must participate in the scoring of the Part B–2 and Part C open-ended questions on a student’s paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student’s answer paper. Teachers may not score their own students’ answer papers.

Students’ responses must be scored strictly according to the Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge, as indicated by the examples in the rating guide. Do not attempt to correct the student’s work by making insertions or changes of any kind. On the student’s separate answer sheet, for each question, record the number of credits earned and the teacher’s assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled “Total Raw Score.” Then the student’s raw score should be converted to a scale score by using the conversion chart that will be posted on the Department’s web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, August 13, 2019. The student’s scale score should be entered in the box labeled “Scale Score” on the student’s answer sheet. The scale score is the student’s final examination score.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student’s final score.

Part B–2

Allow a total of 15 credits for this part. The student must answer all questions in this part.

51 [1] Allow 1 credit for 7 *or* seven.

52 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

First shell: 2
Second shell: 5

First shell: $2e^-$
Second shell: $5e^-$

First shell: two
Second shell: five

53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Nitrogen-14 is more abundant than nitrogen-15.

There are fewer N-15 atoms.

54 [1] Allow 1 credit for Br_2 *or* bromine.

55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The I_2 has stronger intermolecular forces than F_2 .

The F_2 has weaker IMF.

Note: Do *not* allow credit for a response that addresses bonding rather than intermolecular forces.

56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The potential energy of NO increases.

The $\text{NO}(\ell)$ gains PE as it becomes $\text{NO}(\text{g})$.

57 [1] Allow 1 credit for 12 500 J *or* any value from 12 500 J to 13 000 J, inclusive.

58 [1] Allow 1 credit for any value from 11 kPa to 13 kPa, inclusive.

59 [1] Allow 1 credit for any value from 20. g to 23 g, inclusive.

60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

electrons

e^-

Note: Do *not* allow credit for e without the (-) sign.

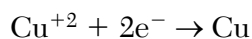
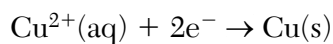
61 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The salt bridge allows the migration of ions between the half-cells.

The salt bridge prevents polarization of the half-cells.

Electrical neutrality of the solutions is maintained.

62 [1] Allow 1 credit. Acceptable responses include, but are not limited to:



Note: Do *not* allow credit for e without the (-) sign.

63 [1] Allow 1 credit for 0.160 M *or* .16 M.

64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The hydronium ion concentration is equal to the hydroxide ion concentration.

The concentrations of H_3O^+ ions and OH^- ions are the same.

65 [1] Allow 1 credit for 12.0 *or* 12 *or* twelve.

Part C

Allow a total of 20 credits for this part. The student must answer all questions in this part.

- 66 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Repeated heatings ensure that all of the water in the sample has been removed.

It is necessary to drive out all of the water from the hydrate.

to make sure all the H₂O is gone

- 67 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\frac{5.06 \text{ g} - 2.47 \text{ g}}{5.06 \text{ g}} \times 100$$

$$\frac{2.59(100)}{5.06}$$

$$\frac{2.59}{5.06} = \frac{x}{100}$$

Note: Do *not* allow credit if the fraction is not multiplied by 100.

- 68 [1] Allow 1 credit for 246 g/mol, *or* any value from 245.989 g/mol to 247 g/mol, inclusive.

- 69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The Na atom is formed when the Na⁺ ion gains an electron.

A Na⁺ ion has 10 electrons and a Na atom has 11 electrons.

A sodium atom has one more electron shell than a sodium ion.

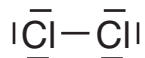
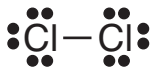
A Na⁺ ion is formed when a Na atom loses an electron.

Note: Do *not* allow credit for a response indicating that the sodium ion lost an electron.

- 70 [1] Allow 1 credit for Ar *or* argon.

71 [1] Allow 1 credit.

Examples of 1-credit responses:



Note: Do *not* allow credit for $\bullet-\bullet$, $\bullet-\bullet$, or $-\bullet$ for a bond, because each \bullet represents one electron and each $-$ represents two electrons.

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The average kinetic energy of the gas molecules in the cabin would decrease.

The average KE would be lower.

73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

$$\frac{(116 \text{ kPa})(2.4 \times 10^5 \text{ L})}{312 \text{ K}} = \frac{P_2(2.4 \times 10^5 \text{ L})}{293 \text{ K}}$$

$$\frac{116 \text{ kPa}}{312 \text{ K}} = \frac{x}{293 \text{ K}}$$

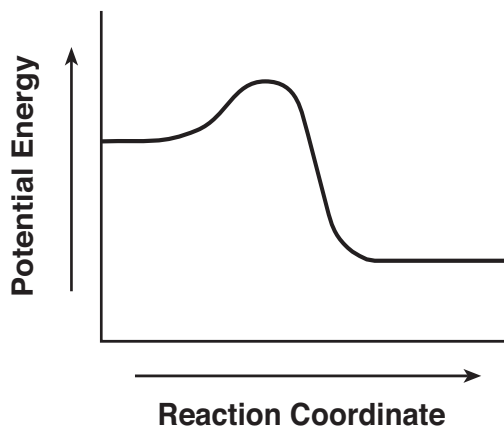
$$\frac{(116)(293)}{312}$$

74 [1] Allow 1 credit for 49.0 mol *or* any value from 49 mol to 50. mol, inclusive.

75 [1] Allow 1 credit for 1.15 atm *or* any value from 1.14 atm to 1.16 atm, inclusive.

76 [1] Allow 1 credit for showing that the PE of the products is lower than the PE of the reactants.

Example of a 1-credit response:



77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The catalyzed reaction has a lower activation energy than the uncatalyzed reaction.

The activation energy is higher for the reaction with no catalyst.

78 [1] Allow 1 credit for 14 mol.

79 [1] Allow 1 credit for C or carbon.

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The hydrocarbon has a carbon-carbon double bond.

The molecule has a C=C bond.

There is a multiple bond in each molecule.

More H atoms could be bonded with this hydrocarbon.

81 [1] Allow 1 credit for C_nH_{2n} .

82 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Argon has a lower ionization energy than helium.

The Ar has a first ionization energy of 1521 kJ/mol and the He has a first ionization energy of 2372 kJ/mol.

Helium has a higher first ionization energy than argon.

83 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

The gamma radiation has much greater penetrating power because it can pass through the aluminum shield.

The alpha and beta particles cannot penetrate the aluminum shield.

The aluminum shield does not stop gamma radiation.

84 [1] Allow 1 credit for 90.6 y. Significant figures do *not* need to be shown.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:



Ba-137

barium-137

Regents Examination in Physical Setting/Chemistry

August 2019

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the August 2019 Regents Examination in Physical Setting/Chemistry* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, August 13, 2019. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Chemistry must **NOT be used to determine students' final scores for this administration.**

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

Map to Core Curriculum

August 2019 Physical Setting/Chemistry			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		50, 58, 59, 65	67, 73, 75
Math Key Idea 2		38, 43, 50, 53, 62, 65	72, 81, 85
Math Key Idea 3		39, 46, 57, 63	68, 74, 78, 84
Science Inquiry Key Idea 1		41, 48, 51, 55, 56, 60, 61, 64	66, 69, 70, 72, 77, 79, 80, 82, 83
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3		31, 32, 34, 36, 40, 41, 44, 45, 46, 47, 48, 54, 56, 58, 59, 61, 62	66, 76, 79, 81, 85
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1			
Key Idea 2			
Key Idea 3			
Standard 6			
Key Idea 1			
Key Idea 2		31	71
Key Idea 3		65	
Key Idea 4		42	
Key Idea 5		59	76
Standard 7			
Key Idea 1		49	
Key Idea 2			
Standard 4 Process Skills			
Key Idea 3		31, 32, 33, 35, 37, 39, 41, 42, 44, 45, 47, 51, 52, 53, 54, 59, 60, 61, 62, 63	68, 71, 73, 74, 78, 80, 82, 85
Key Idea 4		56, 57	76, 84
Key idea 5		55	70, 71
Standard 4			
Key Idea 3	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 51, 52, 53, 54, 59, 60, 61, 62, 63, 64, 65	66, 67, 68, 73, 74, 75, 77, 78, 79, 80, 82, 83
Key Idea 4	30	43, 49, 56, 57	72, 76, 84, 85
Key Idea 5	11, 12, 13, 14, 29	36, 50, 55, 58	69, 70, 71, 81
Reference Tables			
2011 Edition	2, 3, 5, 6, 7, 8, 11, 12, 14, 19, 22, 23, 27, 30	32, 34, 36, 38, 39, 42, 43, 45, 46, 47, 49, 51, 52, 53, 54, 57, 58, 59, 63	67, 68, 69, 70, 71, 73, 74, 75, 79, 81, 82, 84, 85